RF888
SERVICE
MANUAL

18 JULY 89

VERSION 0.0

R & D DEPARTMENT
INTEGRATED DISPLAY TECHNOLOGY LTD.

RF888 SPECIFICATIONS

	UNIT	MIN	NOMINAL	LIMIT
Operating Voltage	V	5.1	6	6.4
Operating Current When buzzer on	mA	-	7	9
Operating Current When key press	mA	-	7	9
Standy Current	uA	-	2	10
Low Battery Voltage	V	5.1	5.2	5.3
Operating Temperature	°C	0	20	40
Storage Temperature	°C	-10	-	70
Auto Shut Off	SECOND	-	60	-
Buzzer Sound Level (distance 10 inch)	dB	-	70	-
Battery Life Time * (Operati	MONTH	-	* 9	-
Unit of Distance Display			Feet/Meter	
Accuracy of Distance Measurement at 20 DEG C			+/- 0.3% And +/- 1 Digit	
Resolution			0.1 Feet or 0.0 Meter	

Note: Nominal specs represent the design specs. All units should be able to approximate these - some may drop and some may slightly exceed. Limit specs represent the worst condition that might be acceptable; no unit should perform less than any limit spec.

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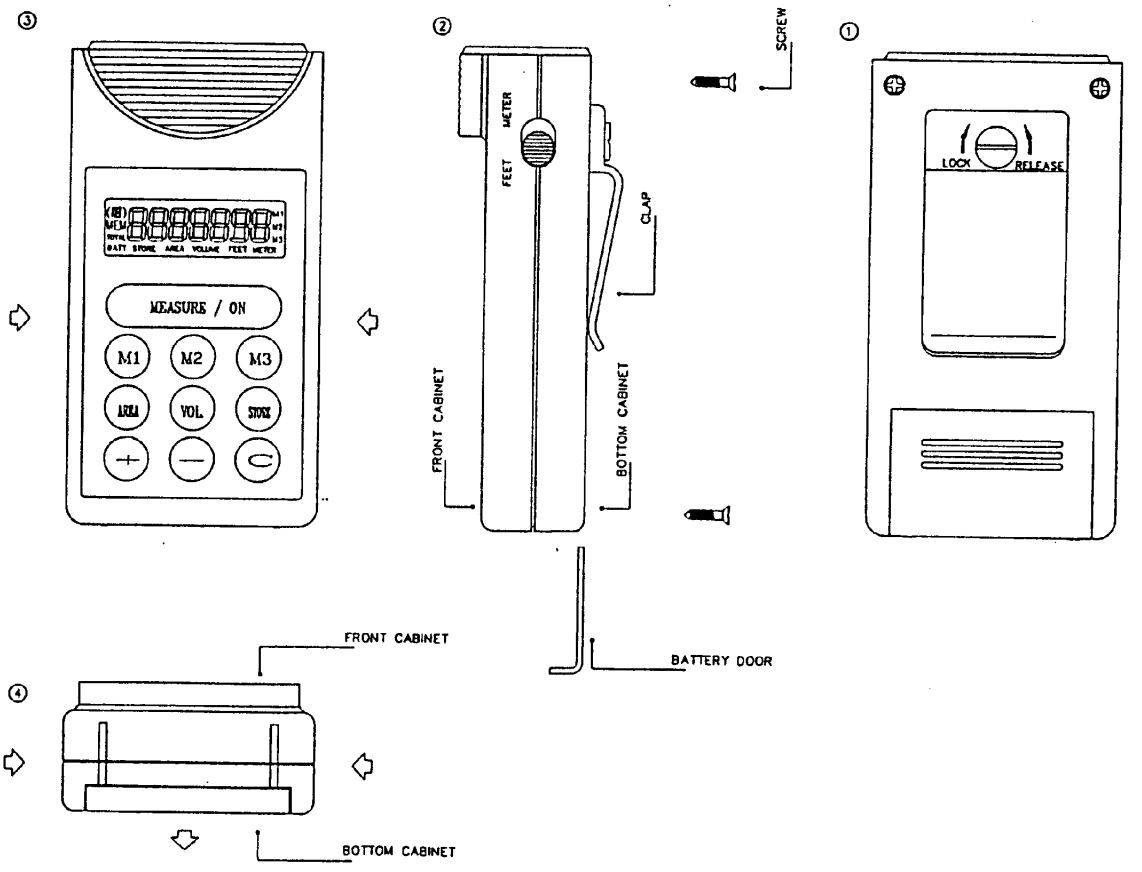
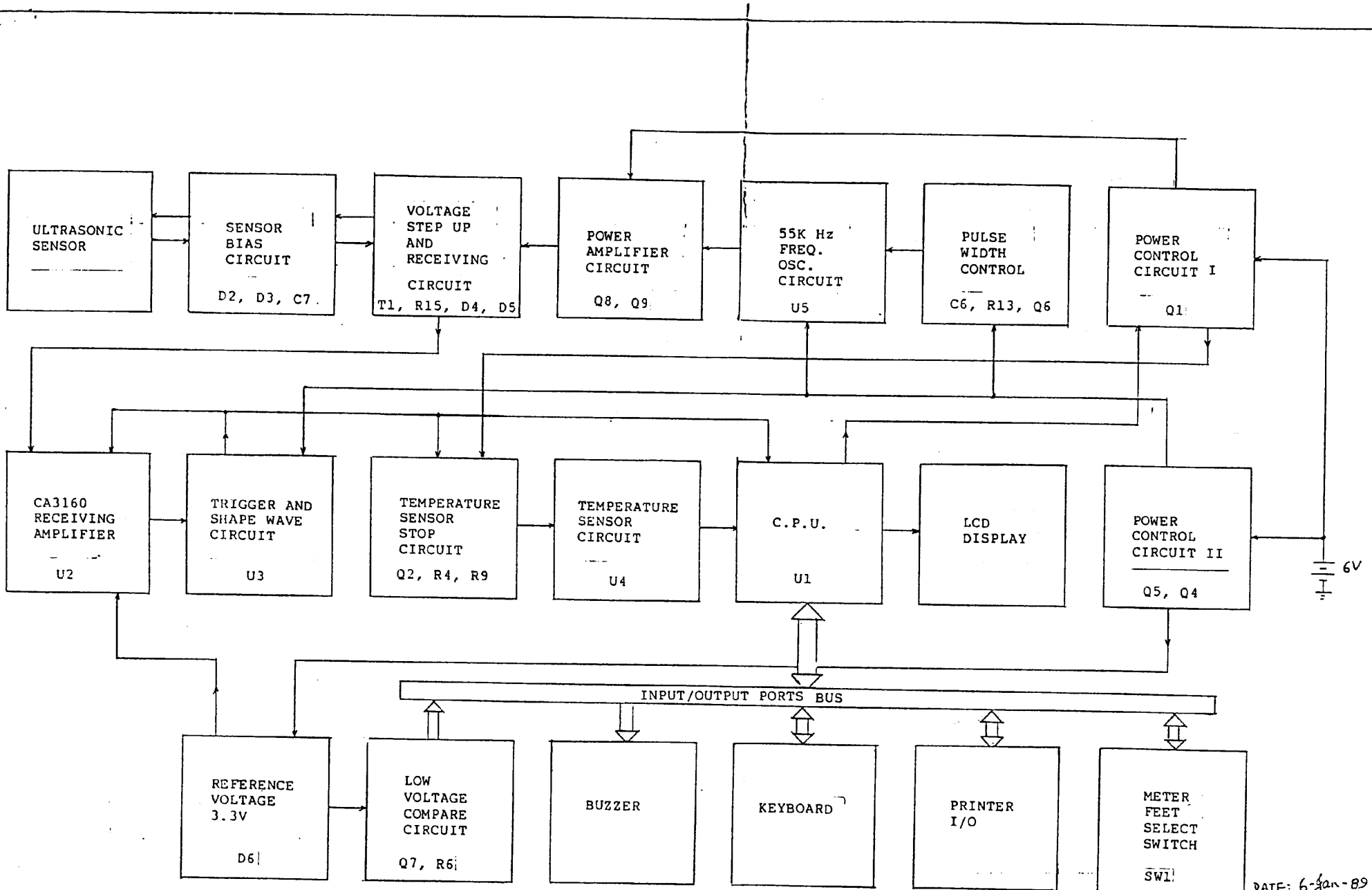
DISASSEMBLY INSTRUCTIONS

1 Slide out the battery compartment cover.
2 Remove the 4 AAA batteries from battery compartment.
3 Remove 4 screws from the bottom cabinet. (Illustration 1,2).
4 Apply pressure (with fingertips) to both side of the front cabinet. Then, pull off the bottom cabinet. (Illustration 3, 4)



BATTERY REPLACEMENT

1 Slide out the battery compartment cover.
2 Remove the batteries with a ball pen or screw driver.
3 Insert the new batteries, observing the correct polarity as shown in the battery compartment.



BLOCK DIAGRAM

DRAWING NO: RD:880301-42-01

DATE: 6-Jan-89

TITLE: PROJECT A BLOCK DIAGRAM			MODEL NO.: RE-8A
MATERIAL:			PART NO.:
SCALE		DRAWN	FINISH:
PROJECTION		CHECKED	
UNIT		APPROVED	

INTEGRATED DISPLAY TECHNOLOGY

Equipment required

- 5" Trigger 2 channel oscilloscope, Kikusui model 5100
- 6V power supply, Soar model 7402
- Alignment screw driver.

Set up (Refer to the illustration)

1. Set up the oscilloscope
   - Vertical position : move the trace line to the bottom of the scale line Grid.
   - Volt/Div : 20mV/Div
   - Probe : 10 Times
   - Slope : +
   - Coupling : A.C. (Input signal)
   - Source : Int
   - Time/Div : 5 mS/Div
   - Sweep mode : Norm
   - Coupling : TV (Trigger channel A)
   - Horizontal display : A
   - Vertical mode : Press channel 1 and channel 2
2. Connect 6 V power supply.
3. Connect the scope channel 1 to Q4 9013 base
4. Connect the scope channel 2 to U3 7555 Pin 6 (T-4)
5. short the test pad (refer to the illustration)
6. Short U3 7555 Pin 2 (T-19) to GND or (short capactor C11 to GND)
7. Connect one 1K ohm resistor across diode D4 1N4148

Alignment procedure

1. Fix the distance between the measured target and the bottom of the case at 4.00 Meter.
2. Scope will show one or more flashing rhombic shape signal. find the rhombic shape signal which is located at about 23 mS from the left end of the trace.
3. Adjust the T1 ferrite and VR2 until the said rhombic signal of 23 mS reaches the maximum amplitude.
4. Adjust the VR3 until display shows 4.00 meter.

Finish procedure

1. Open the test pad (refer to illustration)
2. Disconnect U3 7555 Pin 2 (T-19) from GND (or disconnect capacitor C11 from GND)
3. Disconnect one 1 K ohm resistor from diode D4 1N4148

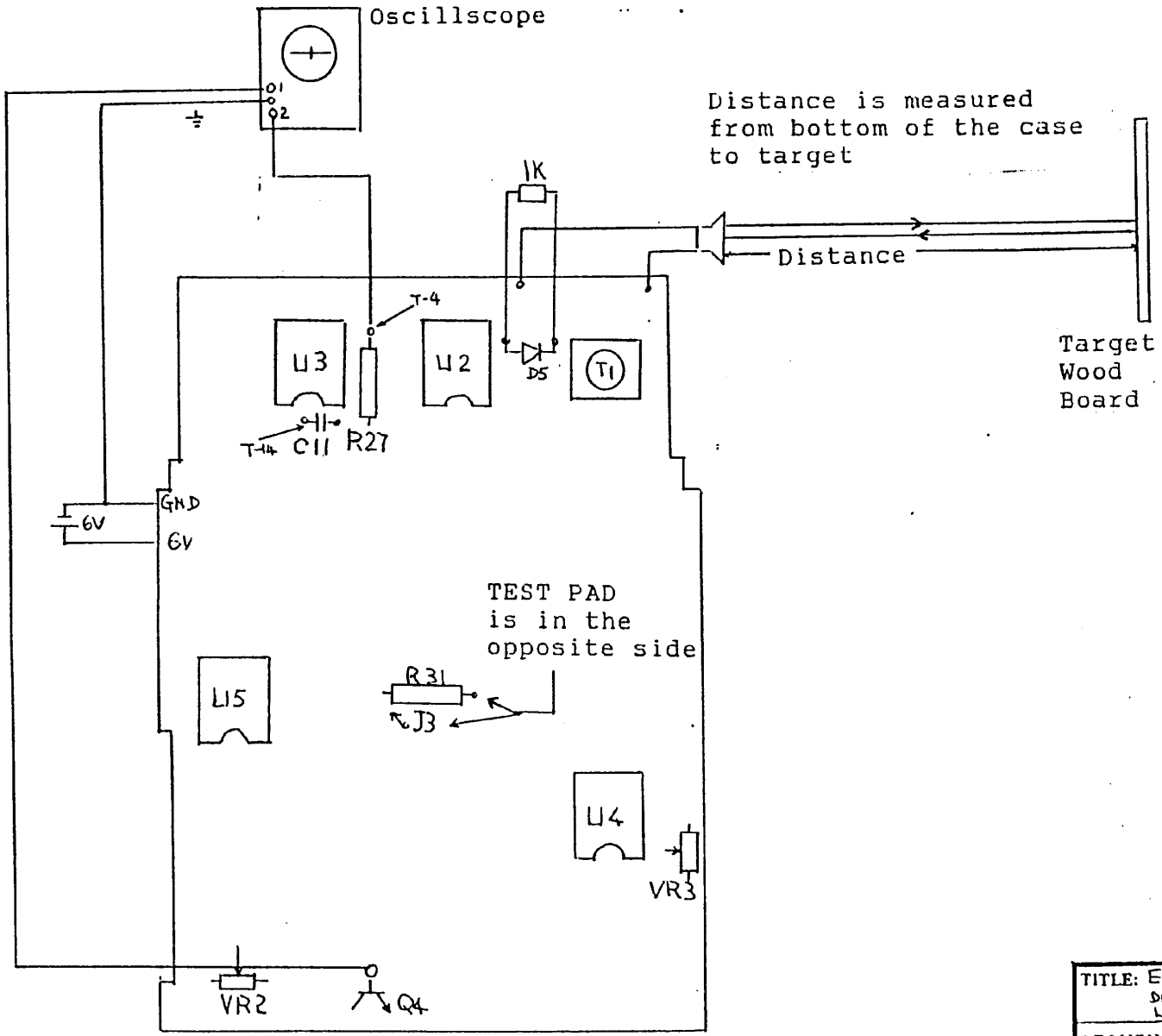


FIG-2

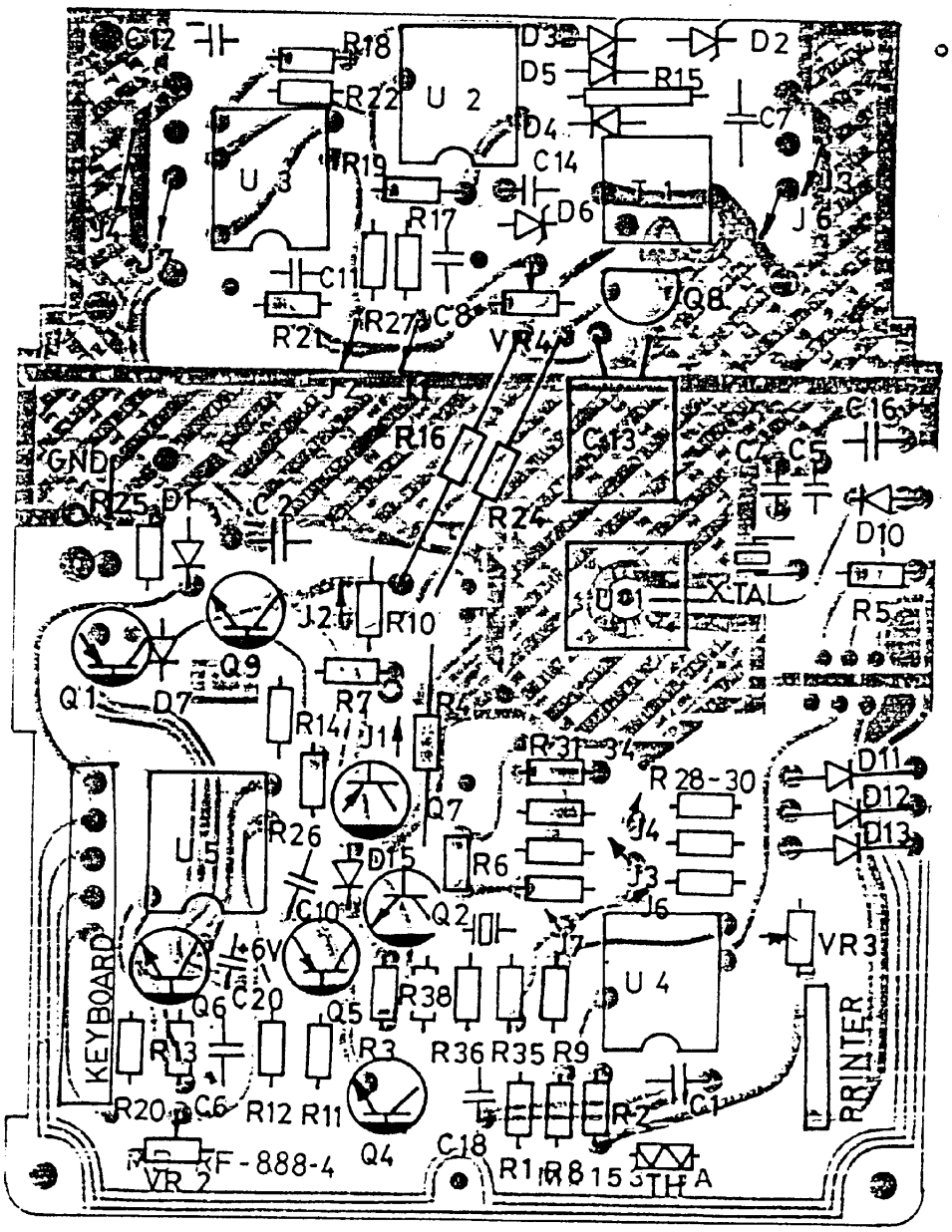
TITLE: EQUIPMENT WIRING SET UP DIAGRAM AND ALIGNMENT POINT LOCATION			MODEL NO.:
			PART NO.:
DRAWING NO: RD-8803(1-15-01			FINISH:
REVISION:		DRAWN	
DATE:	APR-6-89	CHECKED	
UNIT		APPROVED	

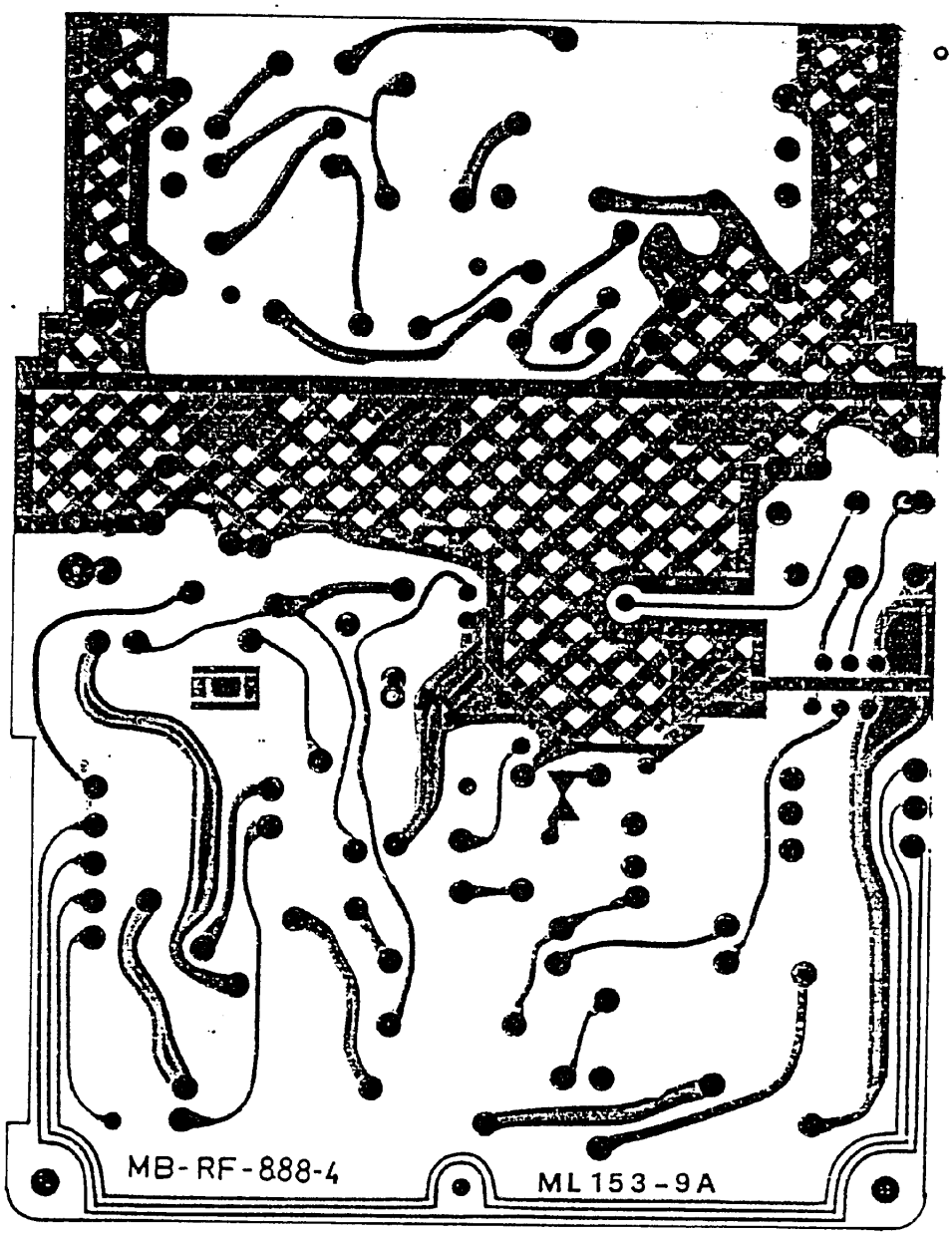
IDT INTEGRATED DISPLAY TECHNOLOGY LTD

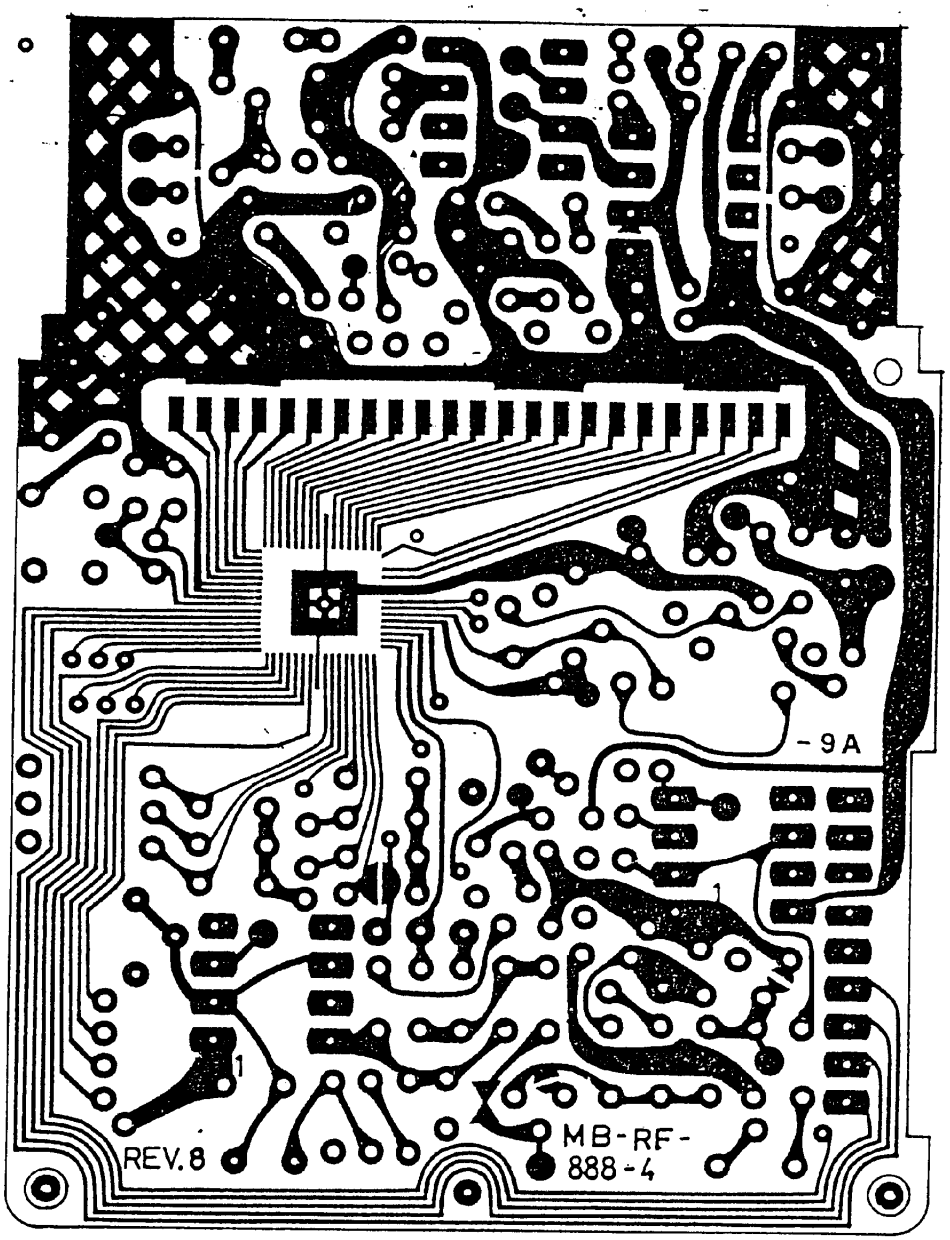
TROUBLESHOOTING

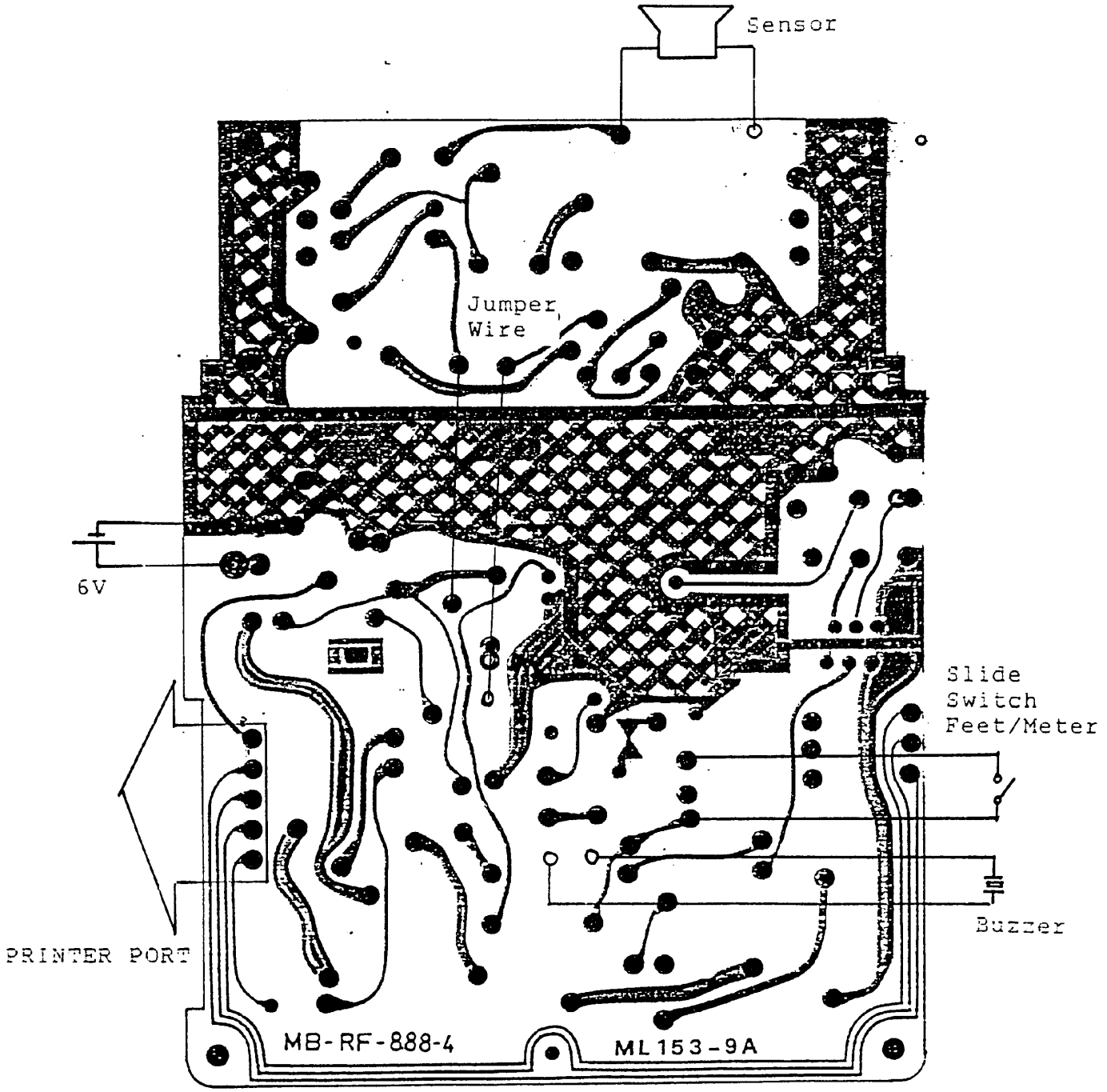
SYMPTOM	CAUSE AND REMEDY
Press measure button twice, no display.	X'TAL, C4, C5 are defective: Replace Still no function after reset, D10, C16 are defective: Replace Weak battery or battery poor contact: Replace Measure Switch SW3 is defective: Replace IC U1 is defective
Press measure button twice, display response "ERROR" Sign Only.	IC U5 is defective: Replace Transistor Q8, Q9 are defecive: Replace Step up transformer T1 is defective: Replace Sensor, D2, D3, C7 are defective: Replace IC U2 CA3160 is defective: Replace
Press measure button twice, display Show "0.00", No response.	Transistor Q4, Q5 are defective: Replace IC U1 is defective C4, C5, crystal are defective: Replace
Press measure button twice, no display, no sound.	No battery IC U1 is defective C4, C5, crystal are defective: Replace
Wrong measurement reading.	Thermister, 100K is defective: Replace IC U4 is defective: Replace Q1 9012 is defective: Replace
No beep sound or weak beep sound, display function normal.	Buzzer wire open circuit Resistor R35, R36 are defective: Replace IC U1 is defective Buzzer is defective: Replace
Battery life is shortened.	Transistor Q1 is defective (short circuit): Replace IC U1 port cannot operate

SYMPTOM	CAUSE AND REMEDY
Cannot obtain right measurement the target at distance up to 40 feet.	Non-reflective material e.g. cloth U2 damage: Replace T1, VR2 offset tuning: Re-alignment.
The minimum distance for measurement is over 2 feet.	Resistor R14 is defective: Replace Capacitor C11, resistor R22 are defective: Replace IC U3 is defective: Replace
Key pad no function	Check membrene key pad. R28, R29, R30, D11, D12, D13 Membrene connector is poor connect.
Low voltage sign always on	Check Q7 9012 Check D6 3.3v Zener IC port R60


C12
R18
R22
U 2
D3
D5
D4
D2
R15
C7
U 3
R19
C14
D6
R17
C11
R21
R27
C8
VR4
Q8
J6
GND
R16
C13
C16
C5
R25
D1
C2
R24
D10
XTAL
R5
J2
R10
Q9
Q1
D7
R7
R14
J1
R4
R31
34
R 28-30
D11
D12
D13
J4
J3
J6
R26
D15
R6
Q7
C10
Q2
6V
VR3
U 4
KEYBOARD
Q6
C20
Q5
R38
R13
R3
R36
R35
R9
R20
C6
R12
R11
C18
R1
R8
R15
R2
C1
PRINTER
VR 2
F-888-4
Q4
TH
A


MB-RF-888-4
ML153-9A


-9A
1
REV.8
MB-RF-
888-4


Sensor
Jumper
Wire
6V
Slide
Switch
Feet/Meter
Buzzer
PRINTER PORT
MB-RF-888-4
ML153-9A

Ref No.	Description	RS Part No.	MFR'S Part No.
CAPACITORS			
C1	MYLAR CAP. 0.01uF +-5% 50V		003-501037-43
C2	CERAMIC CAP 0.1UF +80%-20% 25V		003-251046-13
C3	No use		
C4	CERAMIC CAP 18P +- 5% 50V		003-501807-13
C5	CERAMIC CAP 18P +- 5% 50V		003-501807-13
C6	MYLAR CAP. 3900PF +-5% 50V		003-503927-43
C7	CERAMIC CAP. 3900P 500V +-10%		003-523921-13
C8	MYLAR CAP. 0.01uF +-5% 50V		003-501037-43
C9	No use		
C10	CERAMIC CAP 220P NPO 5%		003-502217-53
C11	MYLAR CAP. 3900PF +-5% 50V		003-503927-43
C12	TANTALUM CAP. 3.3 UF +-10% 10V		003-103351-33
C13	EL-CAP 470uF +80% -20% 10V		003-104776-23
C14	CER-CAP 0.1uF +80%-20% 25V		003-251046-13
C15	No use		
C16	CER-CAP 0.1uF +80%-20% 25V		003-251046-13
C18	CER-CAP 0.1uF +80%-20% 25V		003-251046-13
C19	No use		
C20	CERAMIC CAP 0.1 uF +80-20% 25V		003-251046-13
RESISTORS			
R1	RESISTOR 7.5K 1%		021-400752-51
R2	RESISTOR 68k 1%		021-400683-51
R3	RESISTOR 51K 5%		021-450513-11
R4	RESISTOR 100K 5%		021-451003-11
R5	RESISTOR 100K 5%		021-451003-11
R6	RESISTOR 10K 5%		021-450103-11
R7	RESISTOR 10K 5%		021-450103-11
R8	RESISTOR 2.2K 1%		021-400222-51
R9	RESISTOR 10K 5%		021-450103-11
R10	RESISTOR 100K 5%		021-451003-11
R11	RESISTOR 100K 5%		021-451003-11
R12	RESISTOR 100K 5%		021-451003-11
R13	RESISTOR 180K 1%		021-401803-51
R14	RESISTOR 47K 5%		021-450473-11
R15	RESISTOR 100K 5%		021-451003-11
R16	RESISTOR 1.5K 5%		021-450152-11
R17	RESISTOR 1K 5%		021-450013-11
R18	RESISTOR 3.0K 1%		021-400302-51
R19	RESISTOR 200K 5%		021-452003-11
R20	RESISTOR 56K 5%		021-450563-11
R21	RESISTOR 33K 5%		021-450333-11
R22	RESISTOR 1M 1%		021-400016-51

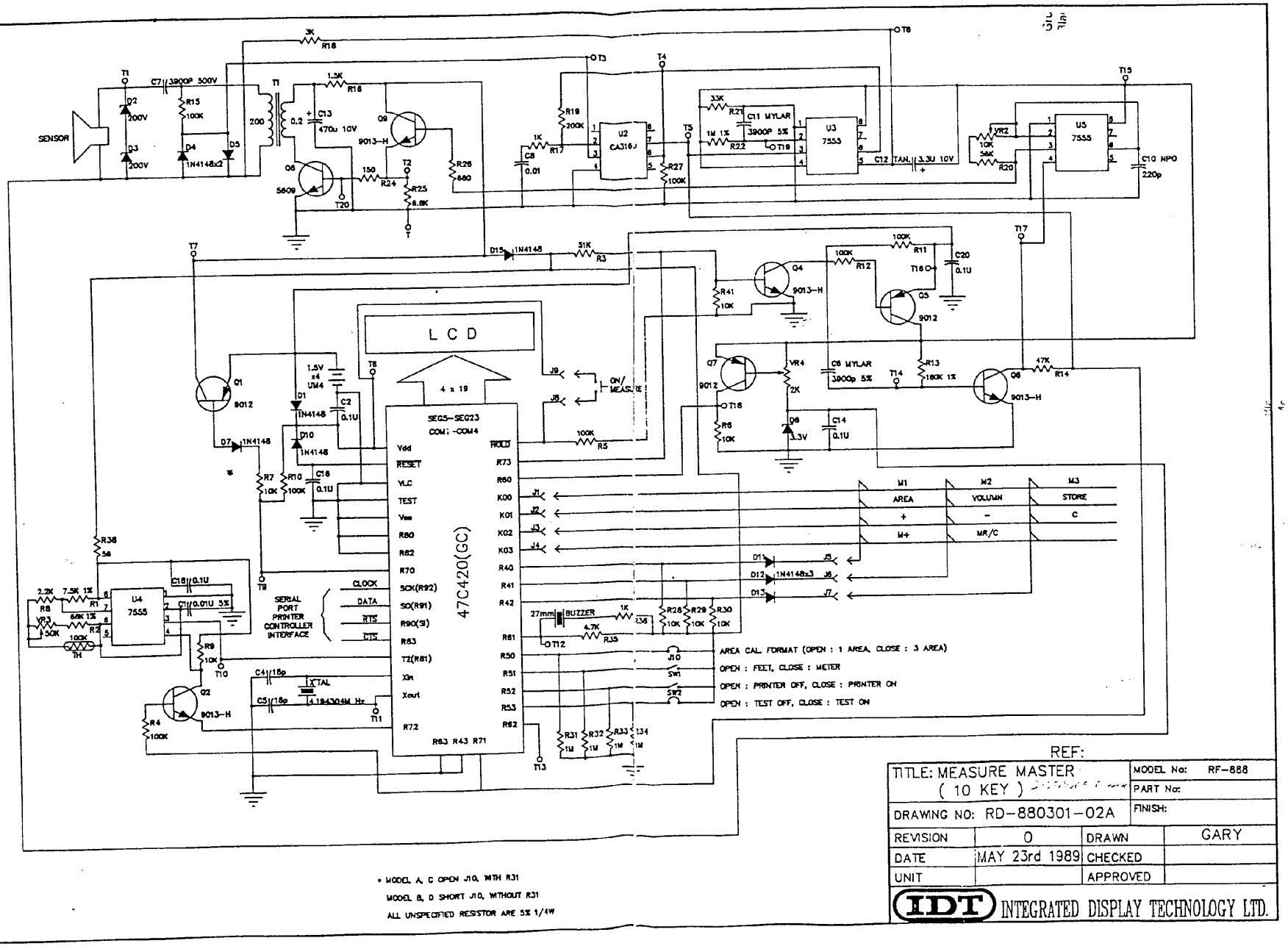
* Mylar is a registered trademark of E.I. Du Pont de Nemours and company

Ref No.	Description	RS Part No.	MFR'S Part No.
RESISTORS			
R23	No use		
R24	RESISTOR 150 5%		021-451500-11
R25	RESISTOR 6.8K 5%		021-450682-11
R26	RESISTOR 680 5%		021-456800-11
R27	RESISTOR 100K 5%		021-451003-11
R28	RESISTOR 10K 5%		021-450103-11
R29	RESISTOR 10K 5%		021-450103-11
R30	RESISTOR 10K 5%		021-450103-11
R31	RESISTOR 1M 5%		021-450016-11
R32	RESISTOR 1M 5%		021-450016-11
R33	RESISTOR 1M 5%		021-450016-11
R34	RESISTOR 1M 5%		021-450016-11
R35	RESISTOR 4.7K 5%		021-450472-11
R36	RESISTOR 1K 5%		021-450013-11
R38	RESISTOR 56 OHM 5%		021-450560-11
R41	RESISTOR 10K OHM 5%		021-450103-11
Thermistor			
TH	THERMISTOR 100K D-5		030-000074-01
Variable resistors			
VR2	VR POT 10K		026-260103-41
VR3	VR POT 50K		026-260503-41
VR4	VR POT 2K		026-260202-41
Diodes			
D1	DIODE 1N4148		010-004148-01
D2	ZENER DIODE Z200A 200v 10%		010-110200-01
D3	ZENER DIODE Z200A 200v 10%		010-110200-01
D4	DIODE 1N4148		010-004148-01
D5	DIODE 1N4148		010-004148-01
D6	ZENER DIODE 3.3V		010-107903-01
D7	DIODE 1N4148		010-004148-01
D10	DIODE 1N4148		010-004148-01
D11	DIODE 1N4148		010-004148-01
D12	DIODE 1N4148		010-004148-01
D13	DIODE 1N4148		010-004148-01
D14	No use		
D15	DIODE 1N4148		010-004148-01

Ref No.	Description	RS Part No.	MFR'S Part No.
Transistors			
Q1	PNP 9012H SILICON TRANSISTOR		023-090127-01
Q2	NPN 9013H SILICON TRANSISTOR		023-090137-01
Q3	No use		
Q4	NPN 9013H SILICON TRANSISTOR		023-090137-01
Q5	PNP 9012H SILICON TRANSISTOR		023-090127-01
Q6	NPN 9013H SILICON TRANSISTOR		023-090137-01
Q7	PNP 9012H SILICON TRANSISTOR		023-090127-01
Q8	NPN 5609 SILICON TRANSISTOR		023-056091-01
Q9	NPN 9013H SILICON TRANSISTOR		023-090137-01
Integrated Circuits			
U1	MICROCOMPUTER (DICE)		005-107458-01
U2	RCA LINEAR I.C. CA 3160E		005-503160-01
U3	INTERSIL TIMER I.C.ICM7555IPA		005-507555-01
U4	INTERSIL TIMER I.C.ICM7555IPA		005-507555-01
U5	INTERSIL TIMER I.C.ICM7555IPA		005-507555-01
MISCELLANEOUS			
B	BATTERY		001-840006-02
BUZZER	PIEZO (27mm)		002-000002-01
BUZZER WIRE	WHITE, DIA. 0.8mm, LENGTH 9cm *2		025-010090-91
DISPLAY	LCD DISPLAY CG227		014-300227-01
MEMBRANE	(9 PINS) P/N 1230-09-01-10		032-000032-01
CONNECTOR			
PC BOARD	D/S G/P MB-RF888-4		016-808519-41
PCB WIRE 1	BROWN, DIA. 0.8mm, LENGTH 3cm		025-010030-11
PCB WIRE 2	ORANGE, DIA. 0.8mm, LENGTH 4cm		025-010040-31
PCB WIRE 3	YELLOW, DIA. 0.8mm, LENGTH 9cm		025-010090-41
PCB WIRE 4	GREEN, DIA. 0.8mm, LENGTH 9cm		025-010090-51
POWER WIRE 1	RED, DIA. 1.2mm, LENGTH 13 cm		025-100130-21
POWER WIRE 2	BLACK, DIA. 1.2mm, LENGTH 13 cm		025-100130-01
RUBBER	(52x5.5x2.5 mm)		011-120176-01
CONNECTOR			
SENSOR	ULTRASONIC TRANSDUCER 7000		047-000001-01
SENSOR	BLACK, DIA. 0.8mm, LENGTH 5 cm		025-010050-01
WIRE 1			
SENSOR	RED, DIA. 0.8mm, LENGTH 5 cm		025-010050-21
WIRE 2			
SW1	SLIDE SWITCH		022-000049-01
T1	VOLTAGE STEP UP TRANSFORMER		030-000016-01
XTAL 1	CRYSTAL 4.194304MHz +-30 PPM		007-419432-21
	DIA 3x9mm		

21-7-89 MECHANICAL PART LIST

Ref No.	Description	RS Part No.	MFR'S Part No.
	BATTERY CONTACT (-VE)		61-001227-01
	BATTERY CONTACT (+VE)		61-001228-01
	BATTERY CONTACT (+-VE)		61-001311-01
	DISPLAY BRACKET		63-001243-01
	T.S. 1.4 X 5 P/H SIL		67-014050-12
	T.S. 2 x 6 P/H WS238 N1		67-020060-12
	T.S. 2 x 10 P/H SHARP BLK		67-020100-41
	SCREW		91-030080-42
	SENSOR CONTACT RECETACLE		61-001319-01
	FRONT CABINET		51-001275-02
	BACK CABINET		52-001224-02
	BATTERY DOOR		53-001125-02
	SENSOR HOLDER		56-001396-01
	CLAMP		56-001398-01
	SLIDE SWITCH CAP		75-001070-02
	MEMBRANE KEYBOARD		76-001439-04
	BU-TAPE (DIA 27 x 24)		87-001425-09
LCD CUSHION	(4 x 18 x 3.2 QX-X21)		89-001081-01
LCD CUSHION	(6mm x 4.5mm x 7mm) RUBBER		89-001081-09



REF:

TITLE: MEASURE MASTER (10 KEY)			MODEL No: RF-888
			PART No:
DRAWING NO: RD-880301-02A			FINISH:
REVISION	0	DRAWN	GARY
DATE	MAY 23rd 1989	CHECKED	
UNIT		APPROVED	

IDT INTEGRATED DISPLAY TECHNOLOGY LTD.

* MODEL A, C OPEN J10, WITH R31
MODEL B, D SHORT J10, WITHOUT R31
ALL UNSPECIFIED RESISTOR ARE 5% 1/4W